COGNEX

PRODUCT GUIDE

CHECKER
Vision Sensors

The Smart Vision Sensor

Looking for the easiest, most affordable way to error-proof your manufacturing process?

The original Checker® vision sensor defined the category, taking the best attributes of photoelectric sensors and adding so much more for manufacturers and machine builders. Today, Checker has a complete product family—spanning from lower-resolution, extremely fast sensors to high-resolution models. And the optional panel-mounted SensorView® display allows users to see what Checker sees—without a PC.

What Checker Is

The Checker vision sensor is an award-winning, all-in-one vision sensor with built-in camera, processor, lighting, optics, and I/O capable of detecting and inspecting up to 6,000 parts per minute—all in an industrial IP67 enclosure small enough to fit into the tightest of spaces.

How Checker Works

Checker detects a part by finding an actual part feature, such as the apple graphic on top of the juice boxes. This provides extremely reliable part detection, unattainable with photoelectric sensors. The optional SensorView display lets users see exactly what's being inspected, as well as production statistics.

Checker Advantages

Inspects features that other sensors cannot.

Because Checker understands what it sees, it can inspect features that other sensors can't, such as a code printed on a label.

Inspects multiple part features simultaneously.

There's no limit to the number of part features you can inspect with a single Checker!

Overcomes varying part positions.

Parts on a line typically vary in position, and Checker tracks all of them without requiring precise part handling.

The ROI of Vision Sensors

Wouldn't it be great if you could use the same sensor for all your product verification tasks?

The Checker product family has the ability to be used for Presence/Absence applications and/or for Measurement applications. Checker can perform multiple "checks" on each product you manufacture. And now that Cognex offers a full range of vision sensors, you have the opportunity to chose the right Checker for your application. Whether it's price, resolution, or speed that is important to you, Cognex offers a sensor to fit your needs.

Checker 3G Series

- No PC required
- Easy to set up inspections through SensorView teach pendant
- Configurable as either presence or measurement sensor
- Standard and high-resolution sensors available
- Patented part detection technology

Checker 200 Series

- Easy setup through your PC
- Solves both presence and measurement applications
- Standard and high-resolution sensors available
- Logic for custom outputs
- Patented part detection technology
- Encoder-based part tracking
- Up to eight outputs

A partial list of the benefits that a vision sensor brings to a manufacturing operation include:

- Reducing scrap
- Reducing downtime and maintenance
- Providing easy setup and maintenance by factory personnel
- Simplifying the overall system design
- Displaying and recording images
- Eliminating the need for costly fixturing
- Eliminating PLC programming
- 100% parts-inspection initiative

Because Checker vision sensors are so simple to set up and easy to install, they offer a very cost-effective solution for inspections where traditional sensors are not reliable and a full-blown vision system is too expensive

CASE STUDY: Vision Sensors Error-Proof Oil Cap Assembly

Supplying parts to the world's leading automotive companies leaves no room for error. That's why Miniature Precision Components Inc. (MPC) uses three vision sensors to error-proof the automated assembly of oil-caps at its Prairie du Chien, WI facility. "We achieve quality through automation, and machine vision has been a key component of our automation strategy for the last 7 years," explains Shane Harsha, MPC Manufacturing Engineering Manager.

"The small size, built-in lighting, variable working distance, ladder logic, and free-running capability make these devices very simple to install. There was no need to wire them to a PLC, no need to install and wire trigger sensors, and the four-step setup makes it by far the easiest vision sensor that I've ever used," says Tooling Engineer Brian Champion.

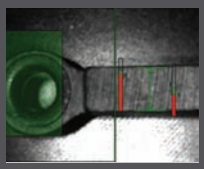
Harsha explains, "If the production rate dropped from 360 to 200 caps per hour, it cost us about $20,000 a year in downtime. As we approach full production volumes, that cost could increase to as much as $120,000 per year."

"Checker vision sensors have helped us achieve zero-defect rates in the manufacturing process, while lowering scrap," notes Harsha. "They are the perfect solution for many of our inspection and error-proofing applications."

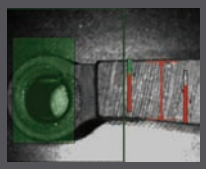
Reliable Error-Proofing for All Industries

Verifying component thickness
Automotive products

- Determines metal part thickness after machining
- Outperforms photoelectric sensors
- No need for constant adjustment
- No need for precise fixturing
- Improves quality
- Reduces manufacturing costs



Correct Thickness

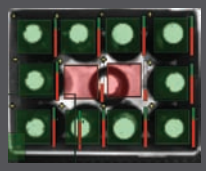


Incorrect Thickness

Detecting missing bottles
Consumer products

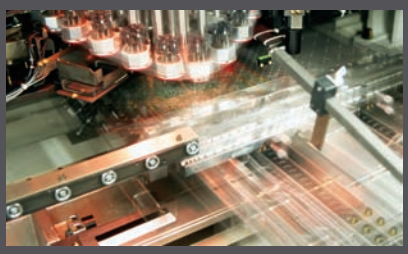
- Confirms required 12 bottles per case
- Replaces 13 photoelectric sensors
- No need for precise fixturing
- Improves quality & yield
- Increases line speed

Case Full

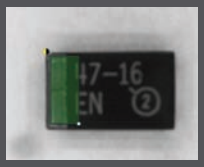


Bottle Missing

Checking component orientation
Electronics products



- Checks SMT component orientation
- Outperforms photoelectric sensors
- Reliable readings even with variable positions and sizes
- Reduces downtime by eliminating position adjustments & minimizing resets
- Maintains high line speeds

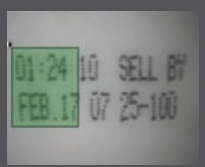


Capacitor Oriented Correctly

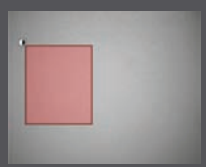
Capacitor Oriented Backwards

Detecting missing caps and lot codes
Beverage applications

- Confirms caps & codes on milk jugs
- Outperforms photoelectric sensors
- Reliable readings even with variable jug positions
- Reduces scrap & maintenance costs
- Increases line speed by elimination of fixturing



Date Code Present

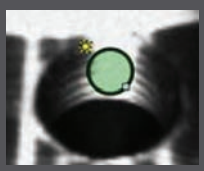


Date Code Missing

No Matter What Industry, Checker Delivers

Verifying threads in hole
Automotive applications

- Detects presence of threads in engine block
- Outperforms eddy current probes
- Consistent accuracy vs. photoeyes
- Reliable, repeatable results
- No need for precise fixturing
- Lowers cost of ownership



Thread Present

Thread Absent

Verifying seal and cap presence
Consumer products

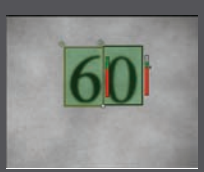
- Detects caps & safety seals on bottles
- Outperforms photoelectric sensors
- No need for precise fixturing
- Minimizes setup & changeover
- Improves output & decreases scrap
- Reduces downtime by elimination of sensor adjustments

Safety Seal Present

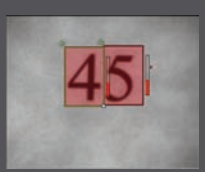
Safety Seal Missing

Matching device product number
Medical products

- Inspects for correct product number on medical devices
- Eliminates manual inspection
- Improves quality
- Drastically cuts rework costs
- Decreases errors during faster line changeovers



Correct Product Number

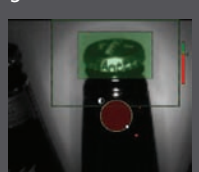


Wrong Product Number

Verifying label presence
Beverage applications

- Checks presence of three labels on beer bottle on high-speed (1100 bpm) line
- Replaces unsatisfactory photo sensor
- Eliminates constant readjustment
- Drastically cuts changeover time
- Improves quality
- Reduces manufacturing cost

Label Present

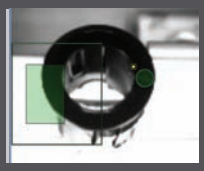


Label Missing

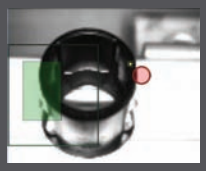
Reliable Inspection Results for Manufacturers

Verifying part orientation
Automotive products

- Detects incorrect orientation of automotive parts in feeder bowl
- Outperforms photoelectric sensors
- Much less expensive than traditional vision system
- Allows 100% correct orientation
- Dramatically reduces scrap & rework



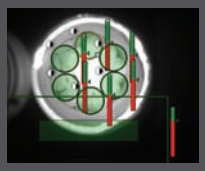
Correct Orientation



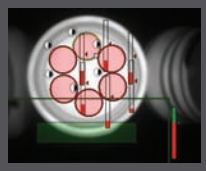
Wrong Orientation

Verifying pill presence
Medical products

- Detects presence of pills in bottle
- Outperforms photoelectric sensors
- Reliable readings even with variable bottle positions
- Maintains high line speed without fixturing
- Minimizes inspection errors
- Improves quality

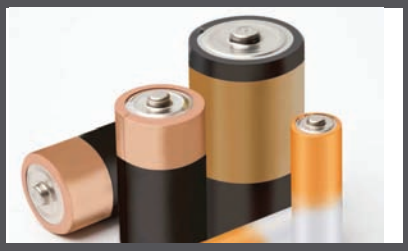


Pill Bottle Full

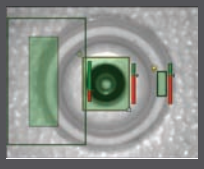


Pill Bottle Empty

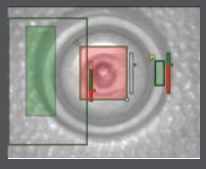
Inspecting seal and bushing in battery
Consumer products



- Confirms presence and positioning of seals & bushings on batteries
- Reliable readings even with variable battery positions
- Eliminates inspection part fixturing
- Increases quality & decreases return rates
- Enables faster line speeds



Good Part



Missing Bushing

Verifying registration
Consumer products

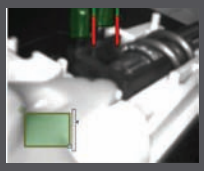
- Pattern-based registration
- Eliminates the need for registration marks
- Eliminates material waste
- Flexible working distance
- For high-speed production lines... up to 6 m/sec
- Better than 100 µsec output repeatability

Mark Detected

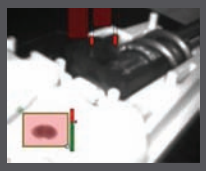
and Machine Builders.

Verifying device assembly
Medical products

- Identifies dowel pins & plastic cover
- Replaces error-prone manual inspection
- Increases product quality
- Drastically reduces rework costs
- Increases line speed



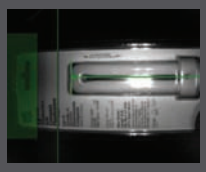
All Parts Present



All Parts Missing

Verifying correct bulb
Consumer products

- Checks for correct-sized light bulb
- Replaces photoelectric sensors
- Allows fewer & smoother changeovers
- Improves quality
- Reduces scrap costs
- Increases yields
- Minimizes customer complaints

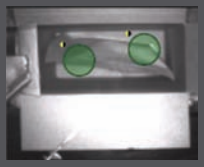


Correct Size in Package

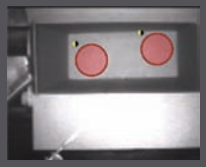
Wrong Size in Package

Detecting missing box insert
Food products

- Confirms flavor pack presence
- Outperforms photoelectric sensors
- Reliable readings even with translucent insert & variable positions
- Cuts rework costs
- Reduces downtime by elimination of sensor adjustments



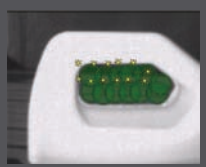
Insert Present



Insert Missing

Verifying slug ejection
Consumer products

- Detects plastic slug presence in bottle
- Eliminates multiple photoelectric sensors
- No expensive fixturing
- Reliable readings even with variable bottle positions
- Maintains line speed
- Handles colors without adjusting

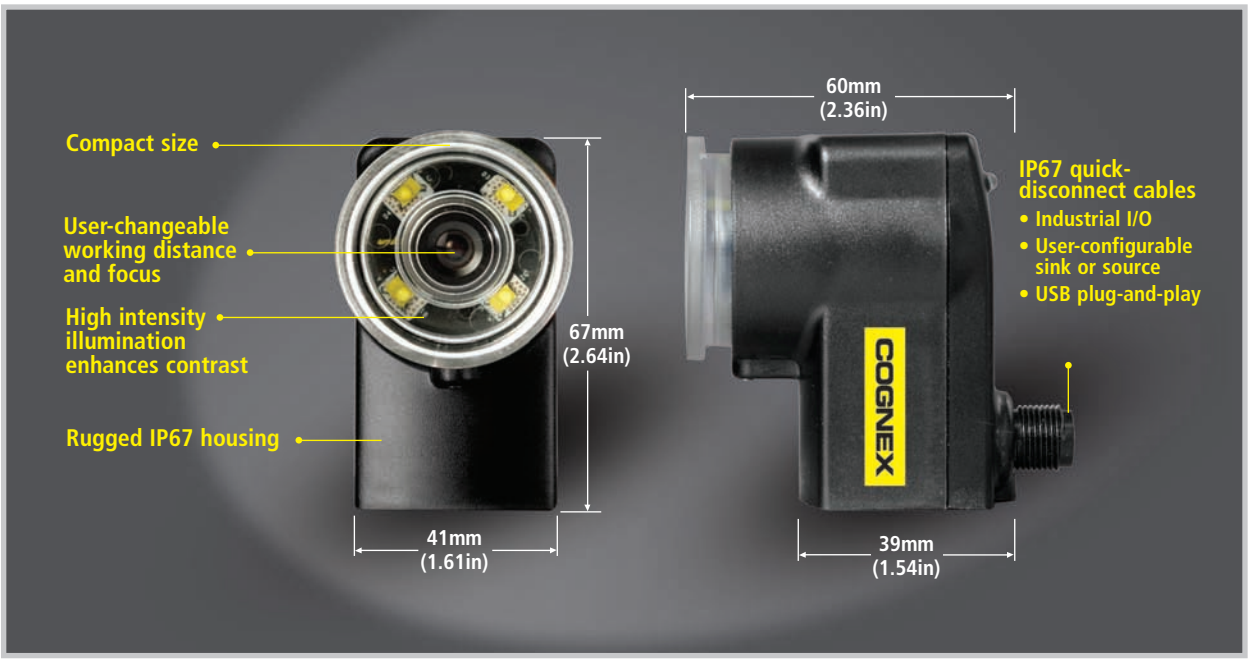


Slug Ejected

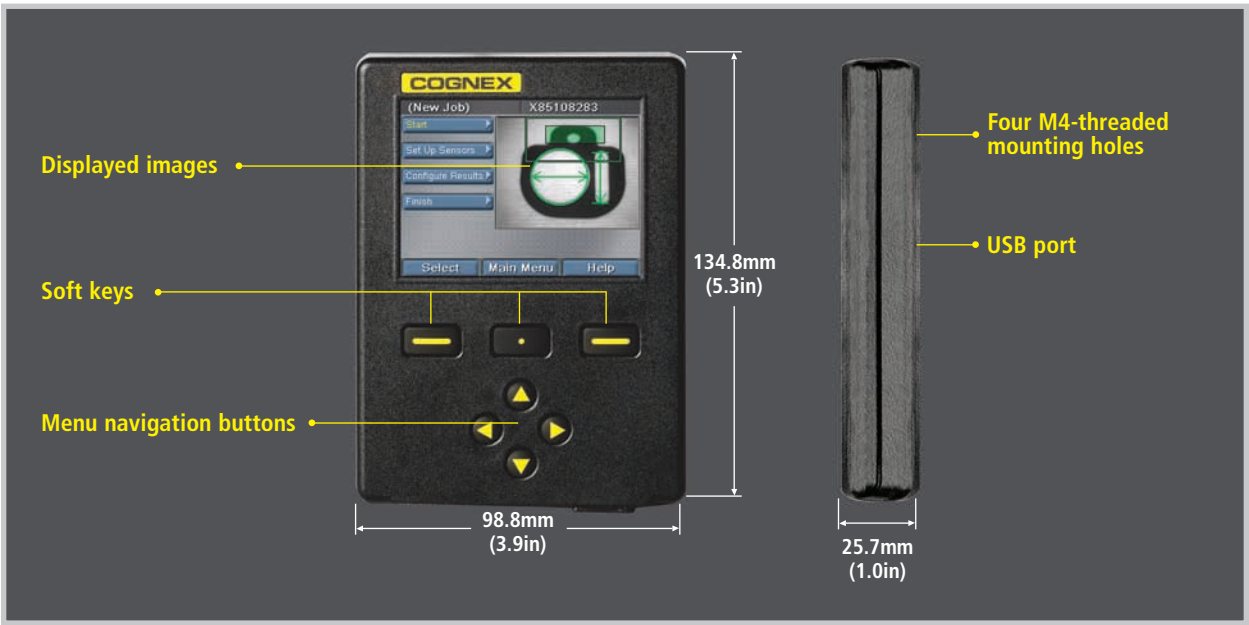
Slug Present

Powerful Things Come in Small Packages

Checker is an all-in-one vision sensor with built-in lighting and a variable working distance, capable of inspecting over 6000 parts per minute—all in a package small enough to fit into tight spaces.



SensorView Teach Pendant is a compact, rugged, panel-mount display for both the Checker 200 and 3G series of vision sensors. More than just a display, SensorView provides production statistics and a user-definable view of the parts that Checker is inspecting. This enables operators to easily monitor their production process, change jobs, or retrain patterns without a PC. Additionally, the Checker 3G series can use a single teach pendant to set up any number of Checker 3G sensors, no PC required.



A Wide Range of Checker

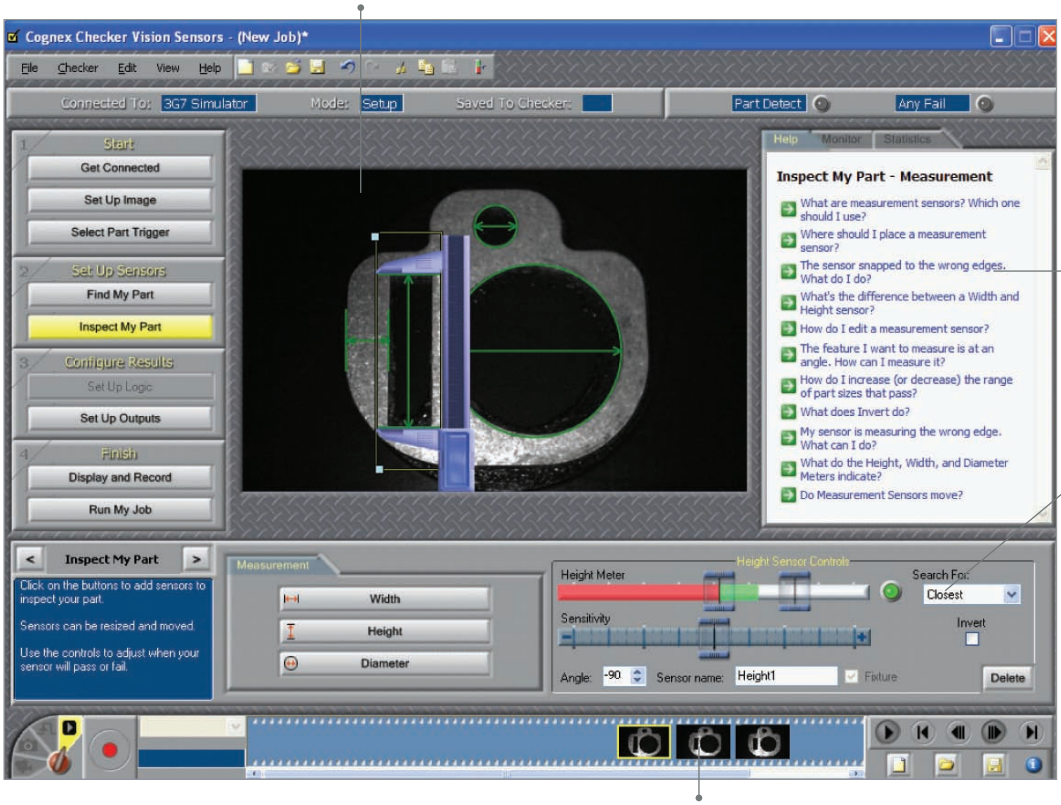
Cognex has expanded the Checker product family to ensure that we offer a sensor for every application. Whether it's resolution, price, or speed that is the most important attribute to you, Cognex offers it all.

Model Features	3G1	3G7	201	202	232	252	272
Part Finding Sensor	✔	✔	✔	✔	✔	✔	✔
Inspection Sensors: Presence	✔	✔	✔	✔	✔	✔	✔
Inspection Sensors: Measurement	✔	✔				✔	✔
Internal Triggering	✔	✔	✔	✔	✔	✔	✔
External Retrain	✔	✔	✔	✔	✔	✔	✔
Job Change	8	8	16	16	16	16	16
PC Software Setup	✔	✔	✔	✔	✔	✔	✔
SensorView Display	✔	✔	✔	✔	✔	✔	✔
SensorView Setup	✔	✔					
I/O Box Connectivity			✔	✔	✔	✔	✔
Encoder-Based Part Tracking			✔	✔	✔	✔	✔
Logic for Custom Outputs				✔	✔	✔	✔
Fast Inspection (over 1600 ppm)	✔		✔	✔	✔	✔	
Ultrafast Inspection (over 6000 ppm)	✔		✔	✔			
Highest Resolution (752 x 480)		✔					✔

One-Click Setup

Checker is simple to set up and operate with One-Click Setup™. Even a first-time user can have it up and running in minutes—without training. Simply select the built-in part finding sensor… place inspection sensors on the features to inspect… then check it with Checker!

The **image display** simplifies setup by enabling you to see what the sensor sees.


Cognex Checker Vision Sensors - (New Job)*
File Checker Edit View Help
Connected To: 3G7 Simulator
Mode: Setup
Saved To Checker:
Part Detect
Any Fail
Start
Get Connected
Set Up Image
Select Part Trigger
Set Up Sensors
Find My Part
Inspect My Part
Configure Results
Set Up Logic
Set Up Outputs
Finish
Display and Record
Run My Job
Help
Monitor
Statistics
Inspect My Part - Measurement
What are measurement sensors? Which one should I use?
Where should I place a measurement sensor?
The sensor snapped to the wrong edges. What do I do?
What's the difference between a Width and Height sensor?
How do I edit a measurement sensor?
The feature I want to measure is at an angle. How can I measure it?
How do I increase (or decrease) the range of part sizes that pass?
What does Invert do?
My sensor is measuring the wrong edge. What can I do?
What do the Height, Width, and Diameter Meters indicate?
Do Measurement Sensors move?
Inspect My Part
Click on the buttons to add sensors to inspect your part.
Sensors can be resized and moved.
Use the controls to adjust when your sensor will pass or fail.
Measurement
Width
Height
Diameter
Height Sensor Controls
Height Meter
Search For:
Closest
Sensitivity
Invert
Angle:
-90
Sensor name:
Height1
Fixture
Delete

Four simple steps walk you through setup.

Dynamic help is always available.

Simple sensor controls are pass/fail—no data or parameters to enter.

Play a filmstrip back in slow motion, or review recent part failures. Like a video recorder, Checker actually records video of parts!

Checker's unique inspection sensors provide the most reliable way to inspect your part:

- **Brightness sensors** look for dark or light areas on the part.
- **Contrast sensors** look for areas on the part that contain both bright and dark areas: date codes, threads, and many other part features.
- **Pattern sensors** understand what your part features look like and let you know when the feature appears.
- **Width sensors** measure the width of a part, component, or feature.
- **Height sensors** measure the height of a part, component, or feature.
- **Diameter sensors** measure the diameter of a part, component, or feature.

The Checker part finding sensor has three important advantages:

1. Detects a part by locating a feature on the part, not just an edge
2. Tracks parts in varying positions along the production line, overcoming imprecise part positioning
3. Does not require additional sensors to determine if a part is present

Specifications

CHECKER VISION SENSORS

LIGHTING

200, 201, 202, 232, 3G1	Integrated red, green, and cyan LEDs
252, 3G7, 272	Integrated bright white LEDs

EXTERNAL TRIGGER INPUT

Input ON	> 10VDC (> 6mA)
Input OFF	< 2VDC (< 1.5mA)
Protection	Opto-isolated, polarity-independent

OUTPUTS

Output	Solid state switch
Rating	100mA, 24VDC
Max voltage drop	3.5VDC @ 100mA
Max load	100mA
Protection	Opto-isolated, protected from short circuit, overcurrent, and reverse polarity

ENCODER INPUTS

Encoder type	300 kHz (max) quadrature encoder. Open collector and differential output.
ON/OFF	50% nominal
Load	50% encoder maximum

JOB CONTROL INPUTS

Jobs supported	8 (3G Series) 16 (200 Series with I/O box)
Input ON	> 10VDC (> 6mA)
Input OFF	< 2VDC (< 1.5mA)
Protection	Opto-isolated, polarity-independent

TERMINATION

12-Pin M12 connector, USB Mini-B receptacle

POWER

Voltage	+24VDC (22-26VDC)
Current	250mA max

MECHANICAL

Dimensions	67mm (2.64in) H x 41mm (1.61in) W x 60mm (2.36in) D
Weight	100g (3.5oz)

MODES OF OPERATION

Internal part trigger, external part trigger, free running

ENVIRONMENTAL

Operating temperature	0° to 50°C (32° to 122°F)
Storage temperature	-30° to 80°C (-22° to 176°F)
Operating humidity	0%-90%, non-condensing
Operating altitude	4000m maximum
Shock	80Gs for 5ms on each axis (per IEC 68-2-2)
Vibration	10Gs (10-500Hz) per IEC 68-2-6
Protection	IP67

CERTIFICATIONS

CE, c**CSA** us, FCC, RoHS

MINIMUM PC REQUIREMENTS

(Only required for setup)

Operating systems	Microsoft® Windows® Vista™, XP™, or 2000™ SP4
RAM	128 MB RAM
USB	USB 1.1 (2.0 recommended for best performance)
Screen resolution	1024 x 768 (96 DPI) or 1280 x 1024 (120 DPI) display

CHECKER SENSORS

Model	Part Number	I/O Cable Type	I/O Cable Included
200	CKR-200-001	Flying Leads	Yes
201	CKR-201-001	Flying Leads	Yes
	CKR-201-002	I/O Box	
202	CRK-202-001	Flying Leads	Yes
	CRK-202-002	I/O Box	
232	CKR-232-001	Flying Leads	Yes
	CKR-232-002	I/O Box	
252	CKR-252-001	Flying Leads	Yes
	CKR-252-002	I/O Box	
272	CKR-272-001	Flying Leads	Yes
	CKR-272-002	I/O Box	
3G1	C3G1-21G-U00	Flying Leads	No
3G7	C3G7-24G-U00	Flying Leads	No

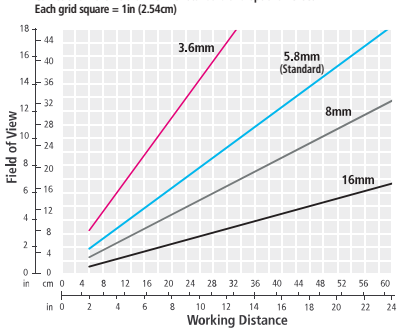
INCLUDED ACCESSORIES

- 5.8mm lens
- Standard USB cable
- Quick Start Guide
- Allen wrench (for focus lock)
- Checker software CD
- USB connector cover
- Mounting screws

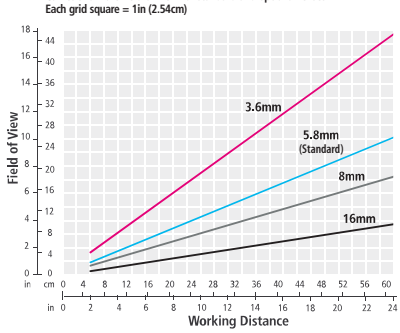
OPTIONAL ACCESSORIES

CKR-200-IOBOX	Checker I/O box
CKR-200-BKT	Adjustable bracket
CKR-200-LENSKIT	Lens kit
CKR-200-CBL-USB	IP67 USB cable
CKR-200-CBL-EXT	I/O extension cable (5m)
C3G-CBL-001	Checker I/O cable

Field of View for Checker 232, 252, 272, and 3G7 Vision Sensors
Curves show the field of view for standard and optional lenses.
Each grid square = 1in (2.54cm)



Field of View for Checker 200, 201, 202, and 3G1 Vision Sensors
Curves show the field of view for standard and optional lenses.
Each grid square = 1in (2.54cm)



SENSORVIEW 350

Note: SensorView is used as either a viewer (all models) or as a handheld programmer (model-dependent).

Viewer models supported	3G Series and 200 Series
Handheld programmer models supported	3G Series only
User-selectable languages	English, German, Italian, French, Spanish, Japanese, Chinese (Simplified), Chinese (Traditional), Korean

POWER

Operating voltage	+24VDC (22-26VDC)
Power consumption	275mA @ +24VDC

ENVIRONMENTAL

Operating temperature	0°C to 50°C (32°F to 122°)
Operating humidity	0 to 90%, non-condensing
Storage temperature	-20°C to 80°C (-4°F to 176°F)
Storage humidity	0 to 90%, non-condensing
Shock	80G x 5ms (IEC 68-2-2)
Vibration	10Gs (10-500Hz) per IEC 68-2-6
Altitude	4000m
Protection	IP65

CERTIFICATIONS

CE, c**CSA** us, FCC, RoHS

MODELS

Part Number	Description
SV-350-001	SensorView 350 panel-mount display

Accessories

SensorView Teach Pendant

A compact, rugged, panel-mount display for both the Checker 200 and 3G series of vision sensors. More than just a display, SensorView provides production statistics and a user-definable view of the parts that Checker is inspecting. This enables operators to easily monitor their production process, change jobs, or retrain patterns without a PC.

Adjustable Mounting Bracket

With metric, imperial, and through-hole mounting. It provides an easy way to adjust the mounting angle of Checker for optimal lighting.

Cables

Extension cables (5m) are available to extend the distance of the included I/O cable. An IP67 USB cable (5m) is available to allow the USB cable to be deployed with Checker.

Lenses

The Checker lens kit includes 3.6, 8, 16, and 25mm lenses

Checker I/O box*

Adds the following capabilities to the Checker 200 series of vision sensors:

- Job change for up to 16 jobs
- External retrain for pattern sensors
- Six additional outputs

*For the Checker 200 Series only

COGNEX **Companies around the world rely on Cognex vision to optimize quality and drive down costs.**

Corporate Headquarters One Vision Drive Natick, MA USA Tel: +1 508.650.3000 Fax: +1 508.650.3344

Americas	
United States, East	+1 508.650.3000
United States, West	+1 615.844.6158
United States, South	+1 650.969.8412
United States, Detroit	+1 248.668.5100
United States, Chicago	+1 630.649.6300
Canada	+1 905.634.2726
Mexico	+52 81 5030-7258
Central America	+52 81 5030-7258
South America	+1 972.365.3463

Europe	
Austria	+43 1 23060 3430
Belgium	+32 2 8080 692
France	+33 1 4777 1550
Germany	+49 721 6639 0
Hungary	+36 1 501 0650
Ireland	+353 1 825 4420
Italy	+39 02 6747 1200
Netherlands	+31 208 080 377
Spain	+34 93 445 67 78
Sweden	+46 21 14 55 88
Switzerland	+41 71 313 06 05
United Kingdom	+44 1908 206 000

Asia	
China	+86 21 6320 3821
India	+91 80 4022 4118
Japan	+81 3 5977 5400
Korea	+82 2 539 9047
Singapore	+65 632 55 700
Taiwan	+886 3 578 0060

www.cognex.com

© Copyright 2009, Cognex Corporation. All information in this document is subject to change without notice. Cognex, Checker, and SensorView are registered trademarks of Cognex Corporation. All other trademarks are the property of their respective owners. Printed in the U.S.A. Lit. No. MK6332-0909.